

## REMARKS

With the entry of the present amendments, Claims 13-16, 18, 19, 22, 23, 30, 32-40, and 42-46 are pending in the application. Claims 1-12, 17, 20, 21, 24-29, 31 and 47-51 have been canceled without prejudice to Applicants' right to prosecute these claims in a timely filed continuation application. Claims 22, 23, 30, and 43-46 have been amended to correct their dependencies and preambles in view of the above-referenced claim cancellations. Claim 1 was also amended. Support for the amendment of Claim 1 may be found throughout the application as filed, including, but not limited to, page 8, lines 9-11 and figure 3. New Claims 52-66 have been added. Support for these new claims may be found throughout the application as filed, including, but not limited to, Claims 22 and 23 as originally filed and page 13, lines 9-12.

In view of the following remarks, reconsideration and withdrawal of the objections and rejections to the application in the Office Action is respectfully requested.

### *I. Objections to the Drawings.*

Figures 3-5 were objected to as unclear and difficult to read. Replacement drawing sheets in compliance with 37 C.F.R. 1.121(d) are submitted with this Amendment and Reply. Figure 3 has been amended to more clearly show the layers in the inset. The portion of Figure 3 beyond the inset has been deleted. Lines 12-14 on page 5 of the specification have been amended to reflect the amendments to Figure 3. Figure 4 has been amended to more clearly show the layers of the light-emitting layer as labeled in originally Figure 4. The portion of Figure 4 beyond the layered light emitting device has been deleted. Figure 5 has been amended to more clearly show the layered ceiling tile fit into a supporting structure.

Applicant believes these replacement drawings sheets overcome the Examiners objection and respectfully request that the objection to the figures be withdrawn.

***II. Objections to the Specification.***

The Examiner objected to the first full paragraph on page 18 of the specification because a serial number was missing. The present amendments to the specification fill-in the missing serial number. Therefore, Applicant respectfully requests that this objection be withdrawn.

The Examiner objected to the title of the application as not descriptive. The present amendments to the specification provide a more description title. In view of these amendments, Applicant respectfully requests that this objection be withdrawn.

***III. Rejection of Claims 1-12, 17, 20, 21, 24-29, 31 and 47-51.***

In the Office Action, Claims 1-12, 17, 20, 21, 24-29, 31 and 47-51 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 6,693,512, issued to Frecska et al. (hereinafter “Frecska”) in view of U.S. Patent Application No. 2003/0057821, issued to Fink (hereinafter “Fink”) and various other secondary references. In order to expedite the prosecution of the application, Applicant has cancelled claims 1-12, 17, 20, 21, 24-29, 31 and 47-51, thereby rendering these rejections moot. For this reason, Applicant respectfully requests that these rejections be withdrawn.

***IV. Rejection of Claims 13 and 16 Under 35 U.S.C. § 103(a).***

Claims 13 and 16 were rejected under 35 U.S.C. § 103(a) as unpatentable over Frecska in view of Fink. Applicant respectfully traverses.

In order to establish a *prima facie* case of obviousness, three criteria must be met: (1) the cited references must provide some motivation to modify the reference teachings; (2) there must be a reasonable expectation of success; and (3) the resulting combination must teach or suggest all of the limitations of the rejected claims. (MPEP 2142) In addition, if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. (MPEP 2143.01 V)

The combination of Frecska and Fink fails to provide a *prima facie* case of obviousness because the combination of the two references, as proposed by the Examiner does not teach each an every limitation of amended Claim 13.

Claim 13 has been amended to clarify that the light-emitting ceiling tile comprises a ceiling tile substrate and a planar light-emitting subassembly that is shaped like the ceiling tile substrate and disposed on the ceiling tile substrate in a laminar arrangement. The light-emitting subassembly of Frecska (identified as item number 100, specifically 110, by the Examiner) is not planar, is not shaped like the ceiling tile, and is not disposed on the ceiling tile in a laminar arrangement. Therefore, the combination of Frecska and Fink fails to provide a *prima facie* case of obviousness. For this reason, Applicant respectfully requests that the rejections of Claims 13 and 16 be withdrawn.

The proposed combination of Frecska and Fink further fails to provide a *prima facie* case of obviousness because the references provide no motivation to combine their teachings, as proposed by the Examiner.

In support of the rejection of Claim 13, the Examiner acknowledges that Frecska does not disclose a light emitting subassembly comprising Group IV nanostructures. However, the Examiner asserts, “Fink discloses a subassembly in an analogous art comprising light emitting Group IV nanostructures (abstract).” Applicant respectfully disagrees with the notion that Frecska and Fink relate to analogous arts. In fact, Frecska and Fink describe very different lighting devices, used in very different applications, which operate by under entirely different principals.

The light-emitting subassembly (100, specifically 110) of Frecska is designed to receive an RFID query signal, compare the query signal to information stored in a memory and emit an output signal in order to indicate the presence of a hidden object in or behind a ceiling tile. (See column 3, line 17 through column 4, line 32 and figure 2.) The output signal device may take the form of a light emitting diode which is activated by an RFID transponder. (See column 3, lines

29-30.) In contrast, Fink describes cathode ray tubes (CRTs) and liquid crystal displays (LCDs) which use silicon nanoparticle-based phosphors. The phosphors of Fink are activated by an electron beam, or by UV light, and convert the electron energy or the UV light into visible light in order to produce a colored image on a faceplate. (See, for example, paragraphs 3 and 18.)

The Examiner has identified no motivation for replacing the RFID controlled light emitting subassembly of Frecska with the CRT or LCD phosphors of Fink.

For this additional reason, Applicant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness and respectfully request that the rejection of Claim 13, and Claim 16 which depend therefrom, be withdrawn.

***V. Rejection of Claims 14-15, 18, 19, 32-39 and 42 Under 35 U.S.C. § 103(a).***

Claims 14, 15, 18, 19, and 32-39 were rejected under 35 U.S.C. § 103(a) as unpatentable over Frecska in view of Fink and further in view of U.S. Patent Application Publication No. 2002/0025391, issued to Angelopoulos et al. (hereinafter “Angelopoulos”). Claim 42 was rejected under 35 U.S.C. § 103(a) as unpatentable over Angelopoulos in view of Fink. Applicant respectfully traverses.

Claims 14, 15, 18, and 19 each depend from Claim 13. Thus, for all of the reasons discussed in Section IV, above, with respect to Claim 13, Applicant respectfully submits that Claims 14, 15, 18 and 19 are also in condition for allowance and respectfully request that this rejection be withdrawn.

With regard to Claims 14, 32 and 42, Applicant further submits that the Examiner has failed to establish a *prima facie* case of obviousness because the cited references provide no motivation to combine their teachings, as proposed by the Examiner.

In support of the rejections of Claims 14, 32 and 42, the Examiner acknowledges that Frecska and Fink do not disclose a light-emitting subassembly that comprises a first

electrical insulation layer, a first electrode layer, a light-emitting layer, a second electrode or a second electrical insulation layer. However, the Examiner states:

Angelopoulos discloses a light-emitting subassembly (figure 3) in an analogous art that comprises a first electrical insulation layer (top glass), a first electrode layer (top transparent electrode), a light-emitting layer (liquid crystal), a second electrode (bottom transparent electrode), and a second electrical insulation layer (bottom glass), for the purpose of emitting light.

With regard to Claim 42, specifically, the Examiner further states:

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a light emitting layer comprising light emitting group IV nanoparticles disclosed by Fink in the method of making a light emitting subassembly disclosed by Angelopoulos, for the purpose of emitting different light wavelengths.

Applicant respectfully submits that in making these statements the Examiner has mischaracterized the device of Angelopoulos and has overlooked important differences between the devices of Angelopoulos and Fink that would make the combination of their elements (as suggested by the Examiner) illogical and inappropriate.

Angelopoulos describes electronic devices having patterned electrically conductive polymers as electrodes. (See abstract.) More specifically, Angelopoulos describes a LCD-based electro-optical transducer that includes a liquid crystal layer disposed between two transparent electrodes, which are themselves disposed between two glass plates. (See, for example, paragraphs 0141, 0142 and figure 3.) The electrodes in this device are used to apply an electric field across the liquid crystal layer in order to align the liquid crystals, thereby controlling their light-filtering properties. (See paragraph 142.) Importantly, the liquid crystal layer of the LCD-based electro-optical transducer of Angelopoulos does not emit any light, and therefore, is not a light-emitting layer, as asserted by the Examiner. Rather the liquid crystal layer acts as a polarizer to filter light incident on the device from an external light source. (See paragraph 0142

and Figures 4a and 4b.) The phosphor materials of Fink do not polarize light. In view of this, there is no motivation to substitute the phosphor material of Fink for the liquid crystal layer of Angelopoulos, as proposed by the Examiner. In fact, such a substitution would render the device of Angelopoulos unsatisfactory for its intended purpose as a *liquid crystal* based electro-optical transducer. According to the MPEP, “if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” (MPEP 2143.01 V)

For each of the reasons discussed above, Applicant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness and respectfully request that the rejection of Claims 14, 32 and 42, and all of the claims that depend therefrom, be withdrawn.

**VI. Rejection of Claims 43-46 Under 35 U.S.C. § 103(a).**

Claims 43-46 were rejected under 35 U.S.C. § 103(a) as unpatentable over Frecska in view of Fink and further in view of U.S. Patent Application Publication No. 2003/0057821, issued to Ilenda et al. (hereinafter “Ilenda”). In support of the rejections of Claims 43-46, the Examiner acknowledges that Frecska and Fink do not disclose the use of a ceiling tile for emergency lighting, in-door lighting, track lighting or direct lighting of an airplane interior. However, the Examiner states that Ilenda teaches lighting for each of these purposes and asserts that it would be obvious to use the ceiling tile disclosed Frecska in view of Fink in these applications. Applicant respectfully traverses.

As discussed above, in order to establish a *prima facie* case of obviousness, the cited references must provide some motivation to combine or modify the reference teachings. In addition, it is improper to combine references where the references teach away from their combination. (MPEP 2145 X. D. 2.) Moreover, if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. (MPEP 2143.01 V)

Applicant submits that the Examiner has failed to establish a *prima facie* case of obviousness because the cited references provide no motivation to use the ceiling tile of Frecska in emergency, in-door, track or direct airplane interior lighting. In fact, Frecska actually teaches away from such applications.

The express purpose of the ceiling tiles with embedded indicator devices of Frecska is to provide a method for identifying ceiling tiles that conceal components of a building's infrastructure. (See, for example, column 1, lines 56-63.) Consistent with this purpose, Frecska makes it clear that the ceiling tiles with the embedded indicators are separate from any ambient light sources (designated by the number "28" in the figures of Frecska) that may be disposed between the tiles. (See, for example, figures 1 and 5, column 2, lines 63-67.) In fact, Frecska explains that the indicators should remain hidden during normal illumination of a room interior by ambient lighting sources. (See column 4, lines 56-62.) Thus, Frecska teaches away from the use of the ceiling tiles with embedded indicators as ambient light sources, such as those that would be used in emergency, in-door, track and airplane interior lighting applications. Instead, Frecska teaches that the ceiling tiles may be used in addition to ambient lighting sources.

Notably, the use of the ceiling tiles with embedded indicator devices of Frecska as ambient lighting sources would actually render them unsatisfactory for their intended purpose, because the use of the ceiling tiles as indicator devices is predicated on their ability to generate a light signal in response to a query signal. If the ceiling tiles and their embedded indicators were used as ambient light sources, the query signal would fail to generate a detectable light signal in an interior space that was already illuminated by the tiles.

For each of the reasons cited above, Applicant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness and respectfully request that the rejection of Claims 43-46 be withdrawn.

***VII. Rejection of Claim 30 Under 35 U.S.C. § 103(a).***

Claim 30 was rejected under 35 U.S.C. § 103(a) as unpatentable over Frecska in view of Fink and further in view of U.S. Patent Application Publication No. 2003/0057821, issued to Srivastava et al. (hereinafter “Srivastava”). In support of the rejections of Claim 30, the Examiner acknowledges that Frecska and Fink do not disclose a ceiling tile that emits white light. However, the Examiner states that Srivastava teaches a device that emits white light and asserts that it would be obvious to have the ceiling tile disclosed Frecska in view of Fink emit a white light in view of Srivastava. Applicant respectfully traverses.

As discussed above, in order to establish a *prima facie* case of obviousness based on a combination of references, the cited references must provide some motivation to modify the their teachings. (MPEP 2142) In addition, it is improper to combine references where the references teach away from their combination. (MPEP 2145 X. D. 2.)

As amended, Claim 30 depends from Claim 13. Thus, for all of the reasons discussed in Section IV, above, with respect to Claim 13, Applicant respectfully submits that Claim 30 is also in condition for allowance and respectfully requests that this rejection be withdrawn.

Applicant believes the Examiner’s suggestion that the phosphors of Fink could be used in a ceiling tile to emit a white light, as described in Srivastava, overlooks important differences between the cathode ray tubes (CRTs) and liquid crystal devices (LCDs) of Fink and the white light illumination systems of Srivastava. These differences make the phosphor materials used in Fink inappropriate for use in emitting white light. Based on these differences, one of ordinary skill in the art would not be motivated to use the phosphor material of Fink to generate a white light.

Fink describes a silicon nanoparticle-based phosphor material for use in CRTs and LCDs. (See, for example, paragraphs 3 and 18.) CRTs are designed to create multicolored images on a phosphor-coated faceplate by aiming an electron beam at the faceplate. The phosphor materials are deposited as pixels (or subpixels) which luminesce in different colors. (See paragraph 3 of Fink.) The color of light emitted from a given pixel depends on the nature of the phosphor



material that has been deposited at that pixel, while the intensity of light emitted depends on the intensity of the electron beam at that pixel. (See paragraph 3 of Fink.) Thus, by adjusting the position of an electron beam on the phosphor-coated screen, a multicolored image can be produced. The LCDs referred to in Fink utilize a faceplate having pixels that transmit different colors of light in order to produce multicolored images. In the invention of Fink, CRTs and LCDs are made by filtering silicon nanoparticles by size and depositing the filtered nanoparticles on the face plate of the CRT or LCD as subpixels, wherein each subpixel contains nanoparticles having a narrow size distribution which emit light of a specific color, typically red, blue or green. This is discussed at length throughout Fink. See, for example, paragraphs 18, 20 and 23-36 and figure 5. The important point here is that the phosphor material of Fink is specifically designed to generate a *multicolored* image. Therefore, there can be no motivation to use of the phosphor material of Fink to generate a white light because such a use would be contrary to the express teachings of Fink. For this additional reason, the Examiner has failed to establish a *prima facie* case of obviousness and Applicant respectfully requests that the rejection of Claim 30 be withdrawn.

***VIII. Rejection of Claims 22 and 23 Under 35 U.S.C. § 103(a).***

Claims 22 and 23 were rejected under 35 U.S.C. § 103(a) as unpatentable over Frecska in view of Fink and further in view of U.S. Patent Application Publication No. 2004/0036130, issued to Lee et al. (hereinafter “Lee”). Applicant respectfully traverses.

As amended, Claims 22 and 23 each depend from Claim 13. Thus, for all of the reasons discussed in Section IV, above, with respect to Claim 13, Applicant respectfully submits that Claims 22 and 23 are also in condition for allowance and respectfully requests that this rejection be withdrawn.

***IX. Rejection of Claim 40 Under 35 U.S.C. § 103(a).***

Claim 40 was rejected under 35 U.S.C. § 103(a) as unpatentable over Frecska in view of Lee and further in view of Angelopoulos. In support of the rejections of Claim 40, the Examiner

acknowledges that Frecska and Lee do not disclose a light-emitting subassembly that includes a first electrode electrically coupled to a plurality of nanoparticles and a second electrode electrically coupled to a plurality of nanoparticles, wherein the first and second electrodes are configured to conduct an applied current to the nanoparticles. However, the Examiner states:

Angelopoulos discloses a light-emitting device (figure 3) comprising a first electrode (top transparent electrode) electrically coupled (abstract) to the plurality of light emitting layer (liquid crystal), and a second electrode (bottom transparent electrode) electrically coupled (abstract) to the light emitting layer (liquid crystal), wherein the first and second electrodes (transparent electrodes) together are configured to conduct an applied current to the light emitting layer, wherein the light emitting layer produces light in response to the applied current (paragraph 188 describes it is necessary to have current going through the light emitting layer in order to produce light), for the purpose of emitting light.

The Examiner further stated that it would have been obvious to one of ordinary skill in the art to use the nanoparticles of Lee in the “light emitting layer” of Angelopoulos.

Applicant respectfully submits that in making these statements the Examiner has mischaracterized the device of Angelopoulos and has overlooked important differences between the liquid crystal layer in the device of Angelopoulos and the photoluminescent nanoparticles of Lee that would make the substitution of the nanoparticles of Lee for the liquid crystal of Angelopoulos (as suggested by the Examiner) illogical and inappropriate.

As discussed in Section V, above, Angelopoulos describes electronic devices having patterned electrically conductive polymers as electrodes. (See abstract.) More specifically, Angelopoulos describes a LCD-based electro-optical transducer that includes a liquid crystal layer disposed between two transparent electrodes, which are themselves disposed between two glass plates. (See, for example, paragraphs 0141, 0142 and figure 3.) The electrodes in this device are used to apply an electric field across the liquid crystal layer in order to align the liquid crystals, thereby controlling their light-filtering properties. (See paragraph 142.) Importantly, the liquid crystal layer of the LCD-based electro-optical transducer of Angelopoulos does not

emit any light, and therefore, is not a light-emitting layer, as asserted by the Examiner. Rather the liquid crystal layer acts as a polarizer to filter light incident on the device from an external light source. (See paragraph 0142 and Figures 4a and 4b.) Applicant further notes that paragraph 0188 of Angelopoulos (which the Examiner relies on for the disclosure of two electrodes that pass a current through a light emitting layer) does not describe the liquid crystal based electro-optical device. Instead, paragraph 0188 of Angelopoulos relates to a electroluminescent organic light emitting diode (OLED).

Lee describes methods for forming *photoluminescent* quantum dots of Group IV semiconductor materials. (See, for example, Abstract and paragraph 6.) Lee clearly defines “photoluminescence” as “the emission of light of a first wavelength (or range of wavelengths) by a substance (e.g., a quantum dot) that has been irradiated with light of a second wavelength (or range of wavelengths).” (See paragraph 41.) Thus, Lee teaches that the quantum dots described therein are activated by light, not by an electrical current. This photoluminescence is very different from electroluminescence, which does rely on the passage of an electrical current through a light-emitting layer to generate light.

The Examiner has failed to identify any motivation to substitute the photoluminescent nanoparticles of Lee for the light-polarizing (but, not light-emitting) liquid crystals of Angelopoulos. In fact, such a substitution would render the device of Angelopoulos unsatisfactory for its intended purpose as a *liquid crystal* based electro-optical transducer. According to the MPEP, “if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” (MPEP 2143.01 V)

The Examiner has also failed to identify any motivation to incorporate the *photoluminescent* nanoparticles of Lee into the *electroluminescent* OLED of Angelopoulos.

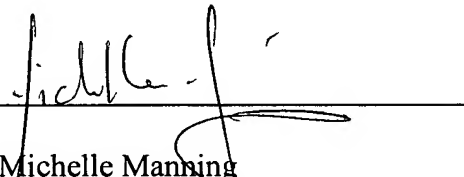
For each of the reasons discussed above, Applicant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness and respectfully request that the rejection of Claim 40 be withdrawn.

In view of the foregoing remarks, Applicant respectfully submits that all of the claims remaining in the application are in condition for allowance and favorable action thereon is respectfully solicited.

Respectfully submitted,

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